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(54) IMPROVEMENTS IN OR RELATING TO ROLLER BEARINGS

(71) We, SKF INDUSTRIAL TRADING AND DEVELOPMENT COMPANY, B.V., a Company organised and existing under the laws of the Kingdom of the Netherlands, of P.O. Box 50, Jutphaas, The Netherlands, formerly of Overtoom 141—145, Amsterdam-W, The Netherlands, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to roller bearings.

The invention provides a roller bearing having two races each with a flange and a series of rollers rolling on both races and, in use, contacting both flanges to transmit axial thrust therebetween which rollers are located in the pockets of a cage having spaced cage bars defining the sides of a series of cage pockets wherein the opposed side faces of each pair of cage bars which define the sides of a cage pocket diverge towards their ends relative to an axis passing through the cage pocket parallel to the cage axis so as to form a waisted cage pocket, the rollers contacting the cage only at the opposed side faces of the cage bars remote from the ends of the cage bars.

According to a feature of the invention the opposed side faces may have portions remote from their ends which are substantially parallel to said axis passing through the cage pocket.

According to a further feature of the invention the angle of divergence between the ends of the opposed side faces may be within the range of 40′ to 2°.

According to a still further feature of the invention, the ends of the rollers may be spherically convex.

One embodiment of the invention will now be described by way of example with reference to the accompanying drawing which is a plan view of a part of a rolling bearing.

Referring to the drawing, there is shown a part of a rolling bearing having a flange 5 depending from one end of its inner race and a flange 6 depending from the opposite end of its outer race. The flange on each race extends radially towards the other race. The surface of the flanges which are to co-operate with the rolling elements of the bearing are inwardly inclined.

A bearing cage shown generaliy by the reference numeral 4 extends circumferentially between the flanges 5 and 6 and comprises cage bars 3 which constitute the side walls of cage pockets 2. A cylindrical roller 1 is shown disposed in a cage pocket 2.

The ends 7 of the cylindrical roller 1 which co-operate with the inclined surfaces of flanges 5 and 6 are spherically convex and this arrangement facilitates lubrication between the roller ends and the flanges.

When the bearing is subjected to an axial force Qa the inclined surfaces of the flanges 5 and 6 contact the ends 7 of the roller 1 to which the force Qa is transmitted. When the roller 1 rotates on the bearing races a frictional force μ.Qa is produced between the roller ends 7 and the inclined surfaces of flanges 5 and 6. If the direction of rotation is clockwise the frictional force μ.Qa acts at each end 7 of the roller 1 in opposite senses to produce a moment L.μ Qa (where L is the length of the roller). This moment tends to rotate the roller clockwise about an axis radially perpendicular to its longitudinal axis. When the roller is rotated about this axis through an angle φ the point of application of the axial force Qa transmitted to the roller is displaced with respect to the roller ends 7 by a distance Z. A second moment Z.Qa, is thereby produced which tends to rotate the roller anticlockwise about the aforementioned axis.

The roller will adopt and remain in an inclined position in the cage pocket 2 when the moments are balanced, that is, when Z.Qa=L.μ Qa. In order that the roller can adopt an inclined position in the cage pocket 2 between flanges 5 and 6 the cage bars 3

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are formed so that the surface of the roller engages the bars only along its mid-section. To this end the cage bars are relatively broader across their mid-sections than at their ends which narrow in the axial direction of the cage. The mid-sections of the opposed faces of each pair of cage bars which define the sides of a cage pocket are substantially parallel and the faces diverge towards their ends.

The dimensions and configuration of the roller 1 and the flanges 5 and 6 are chosen so that the moments are balanced when the roller is rotated as aforesaid through an angle φ, and since the coefficient of friction μ is small in such arrangements the risk of self-braking of the rollers is reduced.

The angle δ which is the angle subtended between a line of extension from the cage bar mid-section and the cage bar end is selected dependent upon the angle of inclination of the roller when the moments are balanced and to accommodate possible crowning of the roller.

A suitable value of the angle δ to fulfil the necessary requirements has been found to be within the range of substantially 20′ and 1°.

Bearings having other than cylindrical rollers are envisaged within the scope of the invention as defined by the appended claims, e.g. the bearing may be a tapered roller bearing.

WHAT WE CLAIM IS:—

1. A roller bearing having two races each with a flange and a series of rollers rolling on both races and, in use, contacting both flanges to transmit axial thrust therebetween which rollers are located in the pockets of a cage having spaced cage bars defining the sides of a series of cage pockets wherein the opposed side faces of each pair of cage bars which define the sides of a cage pocket diverge towards their ends relative to an axis passing through the cage pocket parallel to the cage axis so as to form a waisted cage pocket, the rollers contacting the cage only at the opposed side faces of the cage bars remote from the ends of the cage bars.

2. A roller bearing as claimed in claim 1 wherein the opposed side faces have portions remote from their ends which are substantially parallel to said axis passing through the cage pocket.

3. A roller bearing as claimed in claim 1 or claim 2 wherein the angle of divergence between the ends of the opposed side faces is within the range of 40′ to 2°.

4. A roller bearing as claimed in any of the preceding claims wherein the ends of the rollers are spherically convex.

5. A roller bearing substantially as hereinbefore described with reference to and as shown in the accompanying drawing.

BOULT, WADE & TENNANT.

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1389792 COMPLETE SPECIFICATION

1 SHEET This drawing is a reproduction of the Original on a reduced scale